Gas Leakage System

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Abstract- The heart of this paper here is a LPG gas leakage sensor circuit that detects the outflow of LPG gas and the circuit is a gas sensor module SEN 1327. QM 6 gas sensor is used in the SEN 1327 module. The output signal from SEN 1327 gas sensor module is used to drive a 555 timer based astable multivibrator circuit. Here 555 timer works as a tone generator, the frequency of tone can be altered by varying the preset VR1. The system alerts the user via audio and visual indications.

Index Terms- Leakage sensor,555 timer,sensor modules

I. OPEREATION OF THE CIRCUIT

The gas leakage alarm circuit operates on a 9V PP3 battery. Zener diode ZD1 is used to convert 9V into 5V DC to drive the gas sensor module. A preset in the module is used to set the threshold. Interfacing with the sensor module is done through a 4-pin SIP header.

Whenever there is LPG concentration of 1000 ppm in the area, the OUT pin of the sensor module goes high. This signal drives timer IC 555, which is wired as an astable multivibrator. The multivibrator basically works as a tone generator.

Output pin 3 of IC 555 is connected to LED1 and speaker-driver transistor SL100 through current-limiting resistors R5 and R4, respectively. LED1 glows and the alarm sound to alert the user of gas leakage. The pitch of the tone can be changed by varying preset VR1. It Uses a suitable heat-sink for transistor SL100.

3.1 Circuit Diagram:

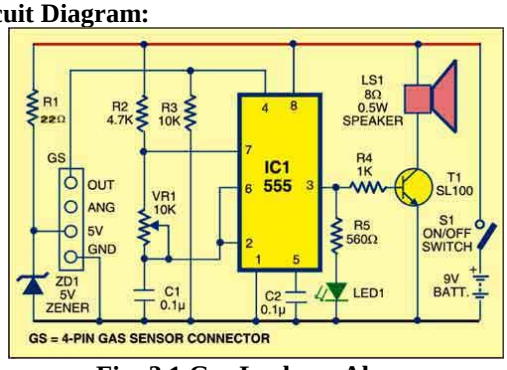


Fig.:3.1 Gas Leakage Alarm

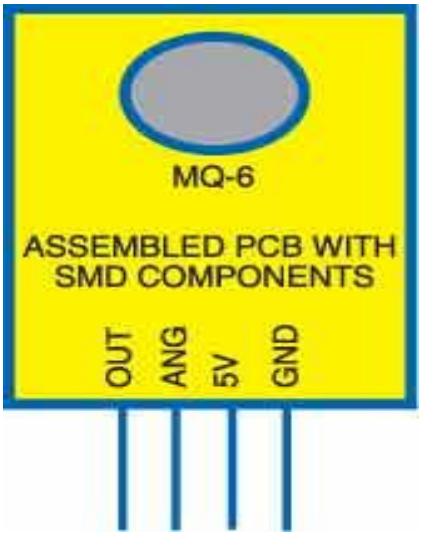


Fig.:3.2 MQ-6 Sensor

3.2 Working:

The gas leakage alarm circuit operates off a 9V PP3 battery. Zener diode ZD1 is used to convert 9V into 5V DC to drive the gas sensor module. A preset in the module is used to set the threshold. Interfacing with the sensor module is done through a 4-pin SIP header.

Whenever there is LPG concentration of 1000 ppm in the area, the OUT pin of the sensor module goes high. This signal drives timer IC 555, which is wired as an astable multivibrator. The multivibrator basically works as a tone generator.

Output pin 3 of IC 555 is connected to LED1 and speaker-driver transistor SL100 through current-limiting resistors R5 and R4, respectively. LED1 glows and the alarm sound to alert the user of gas leakage. The pitch of the tone can be changed by varying preset VR1. Use a suitable heat-sink for transistor SL100.

Here is a LPG gas leakage sensor circuit that detects the outflow of LPG gas and alerts the user via audio and visual indications. The heart of this the simple engineering circuit is a gas sensor module SEN 1327. QM 6 gas sensor is used in the SEN 1327 module. The output signal from SEN 1327 gas sensor module is used to drive a 555 timer based astable multivibrator circuit. Here 555 timer works as a tone generator, the frequency of tone can be altered by varying the preset VR1.

3.3 PCB Layout:

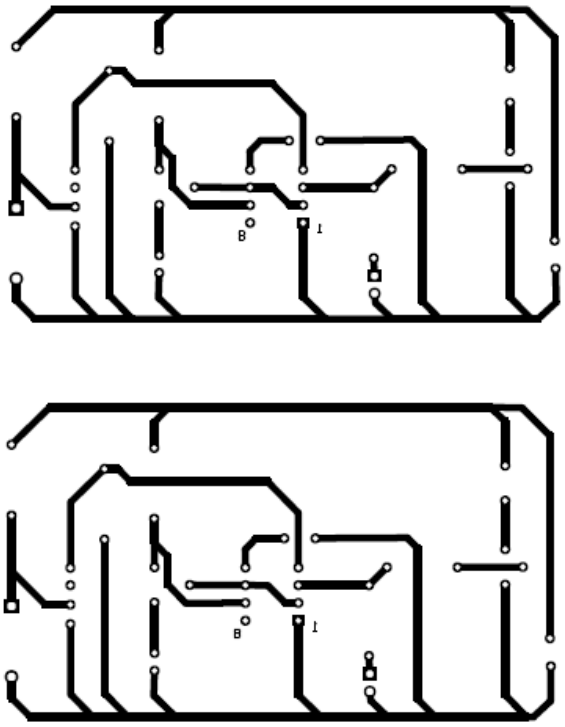


Fig.: 3.3 Layout

5.2 MQ-3 Gas Sensor

This is an alcohol sensor from futurlec, named MQ-3, which detects ethanol in the air. It is one of the straightforward gas sensors so it works almost the same way with other gas sensors. It costs $6.90.Typically, it is used as part of the breathalyzers or breath testers for the detection of ethanol in the human breath.

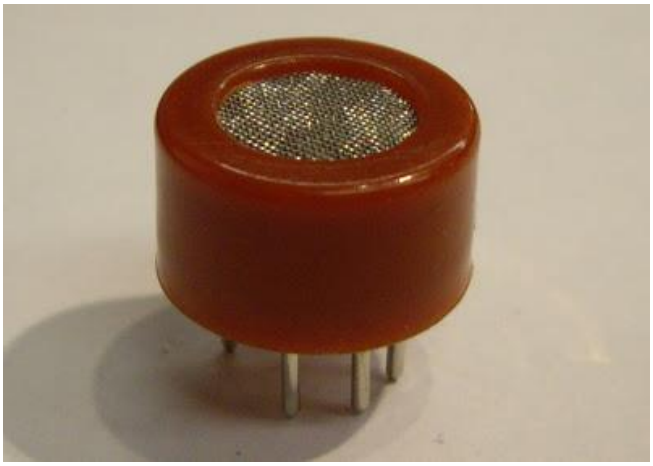
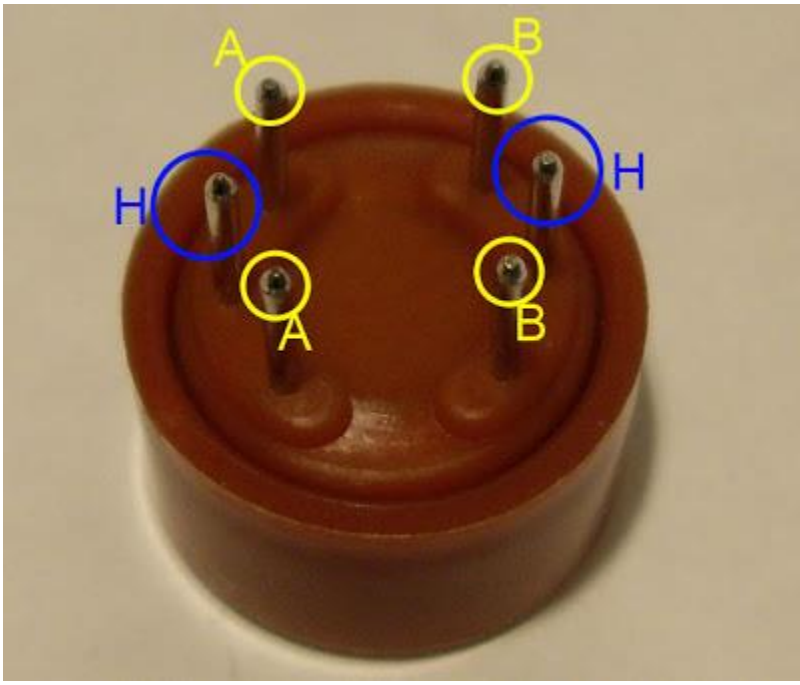
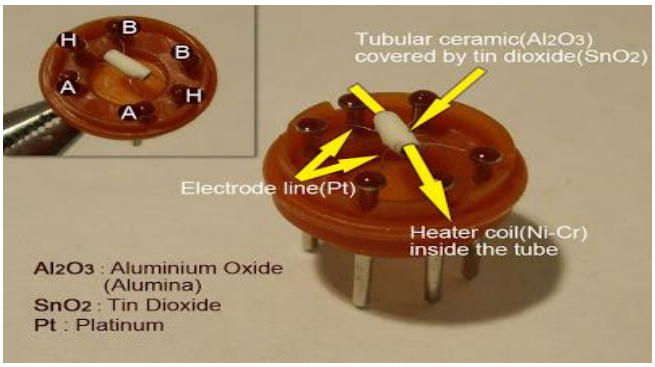


Fig.:5.7 MQ-3 Gas Sensor



If you look at the inside of the sensor, you will find the little tube. Basically, this tube is a heating system that is made of aluminum oxide and tin dioxide and inside of it there are heater coils, which practically produce the heat. And you can also find 6 pins. 2 pins that I called Pin H are connected to the heater coils and the other ones are connected to the tube.



The core system is the cube. As you can see in this cross-sectional view, basically, it is an Alumina tube cover by SnO2, which is tin dioxide. And between them there is an Aurum electrode, the black one. And also you can see how the wires are connected. Basically, the alumina tube and the coils are the heating system, the yellow, brown parts and the coils in the picture.SnO2 ceramics will become the semi - conductor, so there are more movable electrons, which means that it is ready to make more current flow.

Then, when the alcohol molecules in the air meet the electrode that is between alumina and tin dioxide, ethanol burns into acetic acid then more current is produced. So the more alcohol molecules there are, the more current we will get. Because of this current

5.8 Switches:

In electronics, a switch is an electrical component that can break an electrical circuit, interrupting the current or diverting it from one conductor to another.

Fig.:5.14 Switches

The most familiar form of switch is a manually operated electromechanical device with one or more sets of electrical contacts, which are connected to external circuits. Each set of contacts can be in one of two states: either "closed" meaning the contacts are touching and electricity can flow between them, or "open", meaning the contacts are separated and the switch is non conducting. The mechanism actuating the transition between these two states (open or closed) can be either a "toggle" (flip switch for continuous "on" or "off") or "momentary" (push-for "on" or push-for "off") type.

A switch may be directly manipulated by a human as a control signal to a system, such as a computer keyboard button, or to control power flow in a circuit, such as a light switch.

II. Conclusion

LPG gas is supplied in pressurised steel cylinders. As this gas is heavier than air, when it leaks from a cylinder it flows along floor and tends to settle in low spots such as a basement. This can cause fire or suffocation if not dealt with.

Zener diode ZD1 is used to convert 9V into 5V DC to drive the gas sensor module.

The SEN-1327 gas sensor module from RhydoLABZ is used in this circuit. Its output goes high when the gas level reaches or exceeds certain point. A preset in the module is used to set the threshold. Interfacing with the sensor module is done through a 4-pin SIP header.

Whenever there is LPG concentration of 1000 ppm (parts per million) in the area, the OUT pin of the sensor module goes high. This signal drives timer IC 555, which is wired as an astable multivibrator. The multivibrator basically works as a tone generator.

It was experience in making this project as this project consist of so many components hence it give a chance to know about various electronics components. We have successfully completed this project “Gas Leakage Alarm”. We sincerely thanks Mr. Naresh Soni and Mr. Nitin Jain for their invaluable guidance and all the lab assistants for their constant support throughout the making of the project.

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